

REMARKS/ARGUMENTS

Claims 1-18 were pending in this application. According to the March 24, 2003 Office Action, claims 2-7 and 17 and 18 were withdrawn and claims 1 and 8-16 were rejected. Applicants have canceled claims 2-7, 10-12, 17 and 18, amended claims 1, 8, 9 and 14 and added new claims 19 and 20. Accordingly, claims 1, 8-16, 19 and 20 are under consideration. Applicants maintain that the amendments do not introduce any new matter. Specifically, support for the amendments of claim 1 may be found on page 9, first paragraph, of the specification.

Rejection under 35 U.S.C. §112, First Paragraph

The Examiner rejected claims 8 and 9 under 35 U.S.C. §112, first paragraph, allegedly because the specification, while being enabling for the said process using the said catalysts individually, does not reasonably provide enablement for the said process using a combination of the catalysts.

In response, Applicants amended claims 8 and 9 to delete the term “and/or” with thereby limiting the claims to individual catalysts. Accordingly, the Examiner is kindly requested to withdraw this rejection.

Rejection under 35 U.S.C. §112, Second Paragraph

The Examiner rejected claims 1 and 8-16 under 35 U.S.C. §112, second paragraph, as allegedly being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicants regard as the invention.

In response, Applicants amended claim 1 to replace the term “industrial conversion” with “catalytic conversion”. Applicants also amended claims 8 to delete the term “e.g.” Furthermore, Applicants deleted claims 10-12 and amended claim 14 to delete the term “suitable.”

With regard to claim 13, Applicants maintain that a promoter is a substance which increases the effectiveness or activity of a catalyst and that this claim should not be limited to particular promoters. It is not necessary that the promoter participates in the chemical reaction. However, it is not fully understood in which way promoters work. Among others the following functions of promoters are suggested:

1. Promoters block at least one part of the surface of the metal catalyst and thus prevent the poisoning of the catalyst.
2. Promoters accelerate (due to the formation of new catalytically active centers) the rate of the conversion (e.g. oxidation).
3. The presence of promoters changes the absorption characteristics of the metal catalyst.
4. The promoters act as redox pair and make the oxidation of the reactants easier.

The use of a promoter is, for example, disclosed in Au et al. (see column 1, lines 55-60) and Gubitosa et al. (page 1, first paragraph). Both documents were cited by the Examiner.

Accordingly, the Examiner is kindly requested to withdraw these rejections.

Rejection under 35 U.S.C. §102(a)

The Examiner rejected claims 1 and 8-16 under 35 U.S.C. §102(a) as allegedly anticipated by Gubitosa, Au and Capik et al.

In response, Applicants respectfully traverse this rejection. Nonetheless, Applicants have amended claim 1 to indicate that the catalyst is a “polymer-coated metal particles with a total diameter in a range from 3-200.”

The document of Au et al. relates to palladium/bismuth/carbon catalysts which can be used in the oxidation reaction of an aldose to a salt of aldonic acid. In contrast to the present teaching, Au et al. do not disclose a metal catalyst, which is constituted by metal particles, which have a size in the nanometer range and which are coated by a polymer.

Therefore, the metal catalyst used in the present invention is new in comparison to the catalyst used in Au et al. Accordingly, Au et al. do not anticipate the present invention and the Examiner is kindly requested to withdraw this rejection.

The document of Capik et al. relates to metallic nickel and finely divided nickel phosphate supported on an inert carrier which can be used in a process for the preparation of polyhydric alcohols from carbohydrates. Capik et al. do not disclose a metal catalyst, which is constituted by metal particles, which have a size in the nanometer range and which are coated by a polymer.

Therefore, the metal catalyst used in the present procedure is novel in comparison to the catalyst used in Capik et al. Accordingly, the Examiner is kindly requested to withdraw this rejection.

The document of Gubitosa et al. relates to a metallic catalyst composition on an inert support, which can be used for the hydrogenolysis reaction of higher polyhydric alcohols. The catalyst support preferably comprised powdered or granulated carbon. According to page 4, second paragraph, the granulated activated carbon has a minimum granule size of at least 0.5 mm and a particle size of between 5.7 and 0.5 mm.

Whereas the document of Gubitosa relates to the use of a granulated carbon supported metallic catalyst with a size in the mm range, the metal particles of the present invention used as catalyst have diameter in the nm range. Therefore, the metal catalysts of the present invention

have a size which is 1:1,000,000 of the size of the catalyst described in the document of Gubitosa. Furthermore, Gubitosa et al. do not describe that the catalyst is coated by a polymer.

Therefore, the catalyst of the present teaching is novel in comparison to the catalyst described by Gubitosa. Accordingly, the Examiner is kindly requested to withdraw this rejection.

In summary, the present metal catalyst differs from the catalysts known in the art by:

- 1) the considerably larger metallic surface due to the use of metal particles with a size in the nm-range and
- 2) the polymer coating of the metal particles.

Both features are not described in the prior art. Therefore, as indicated above, the present metal catalyst having the form of polymer-coated metal particles are novel.

In addition to the above, the technical problem underlying the present teaching is to provide methods and means for the conversion of carbohydrates, in particular metal catalysts, which are not prone to a deactivation of the catalyst and maintain their activity and selectivity over a long period and which therefore can be used for conversion processed of carbohydrates in industrial scales. The present invention solves this technical problem by providing metal catalysts in form of polymer-coated metal particles with a size in the nm-range.

The polymer coating surprisingly stabilizes the catalytic metal particles, so that these metal particles are not deactivated during the catalytic conversion proved the stabilizing interaction between polymer and metal nanoparticles is retained. It is also surprising that the present metal catalysts can be used for hydrogenation reactions for large molecules such as carbohydrates. The person skilled in the art would rather have expected a so-called diffusion-limitation meaning that the present catalysts cannot be used for the conversion of carbohydrates.

The beneficial effects of the present metal catalyst are shown in the experiments described in the specification. For instance, in example 8, the oxidation of sucrose by using the present catalyst and a control catalyst prepared according to methods known in art is compared. The results of these experiments are shown in Figure 5. From Figure 5 it is obvious that the activity of the comparison catalyst continuously decreases over 10 feeds (of 24 hours in each case), whereas the activity of the present catalyst remains unchanged, even at day 10. Furthermore, the comparison catalyst produced a higher proportion of byproducts than the present catalyst. The same results are obtained in the other experiments (see for instance example 9 and Figure 5).

These results show that the present polymer-coated metal particles with a size in the nm-range are not only clearly different from the catalysts known in the art with regard to their larger surface and the polymer coating. The present metal catalysts also differ from the catalysts known in the art in that they are not deactivated during the conversion of carbohydrates and in that they show a higher activity and selectivity.

However, in none of the documents cited by the Examiner it is described or suggested to use polymer-coated metal nanobeads as catalyst in the conversion of carbohydrates in order to prevent the catalyst deactivation and stabilize the catalyst.

In Au et al., it is suggested to add formaldehyde during the oxidation process in order to slow the deactivation process (see example 3, table). However, there is no hint that a coating of the metal catalyst could prevent deactivation.

Capik et al. does not relate to the technical problem underlying the present invention, namely to prevent a deactivation of metal catalysts. In column 2, lines 66-72, it is only mentioned that the catalysts described can be used in six to eight consecutive runs before reactivation is required. However, the present catalysts can be used much longer (at least 10 times as evident from the figures). There is also no hint that a coating of the metal catalyst could

prevent deactivation and allows the use of a catalyst in more than 10 runs. The same holds true for WO 03/14867.

The present procedure relating to the conversion of carbohydrates, therefore, is not anticipated nor is it obvious by the three cited documents.

In light of the foregoing, it is respectfully submitted that this application is now in condition to be allowed and the early issuance of a Notice of Allowance is respectfully solicited. If there are any issues or amendments the Examiner wishes to discuss, the Examiner is encouraged to contact the undersigned.

I hereby certify that this correspondence is being deposited with the United States Postal Service with sufficient postage as First Class Mail in an envelope addressed to: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450, on September 10, 2003:

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Signature

September 10, 2003

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Respectfully submitted,



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